

Portuguese version of the standardized Nordic musculoskeletal questionnaire: cross cultural and reliability

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Title: Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire: cross cultural and reliability

Article Type: Original Article

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Abstract: Background The self-administered questionnaires are fundamental for clinical assessment and research. The accessibility and constant use of recognized questionnaires in different languages facilitates the compilation of reliable data in international multicenter studies.

Aim The purpose of this study was to carry out a cross-cultural adaptation of the Standardized Nordic Musculoskeletal Questionnaire for Portuguese workers and to investigate the psychometric properties of the Portuguese version.

Methods Sixty warehouse workers completed the questionnaire booklet containing the newly translated version of the Standardized Nordic Musculoskeletal Questionnaire (NMQ) and the Oswestry Disability Index (ODI). To test reliability all the individuals completed for a second time the Standardized Nordic Musculoskeletal Questionnaire after a week. The study is in accordance with the ERGHO guidelines for cross cultural adaptation.

Results The Kendall's tau-b correlation coefficient demonstrated existence of association to the upper back region variable "last 7 days" (0.350 to $p < 0.01$), low back region variable "last 7 days" (0.290 to $p < 0.05$), and low back region variable "limitations in daily activities" (0.479 to $p < 0.01$). These results showed a moderate correlation between the NMQ and ODI.

Through the Kappa agreement correlation coefficient, we observe that the majority of the correlation coefficients were between 0.8 and 1, showing the existence of a strong to a very strong association, indicative of good levels for test-retest reliability.

The Kuder-Richarson coefficient of reliability showed a correlation coefficient of 0.855 indicative of good internal consistency.

Conclusion The Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire for Portuguese workers seems to be valid revealing good coefficients of reliability.

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Editor-in-Chief
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Dear reviewer#1

Thank you very much for your time, kindness and your scientific adviser, they were very useful and valuable.

Regarding the advices of Reviewer #1, I made the corrections:

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* It is uncommon to state the used statistical software. Recommendation: leave it out.

I am sorry, but I do not agree with you. Following the editorial instruction in the examples that I saw it is used the statistical software. Besides, in my opinion I think it is important because it was used two statistical software.

Theoretical advices:

* The concept of validity does not appear before the section "Statistical". Recommendation: Include this concept in the introduction.

Thank you very much for this advice. Already done, also I include in Methods near the Reliability

* The authors say "We believe that the Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire for Portuguese workers seems to be valid and reliable." The findings of the paper support this statement just for the reliability. For the validity the results are weaker. This assumption needs to be explicitly tailored to findings.

Thank you very much for this advice. The results and discussion are now more clear and rich.

* How to read table 2? What does number 1 mean? That all respondents gave the same answer at time x and time y? Recommendation: Outline one example of interpretation in the text.

* Please provide an explanation why the "upper back" is the only item with variations in all three questions?

The interpretation of 1 means that all the individuals gave the same answer in the 2 moments with a one-week interval. I think now the results, as I said before are more clear and rich. The explanation of table 1 will be helpful to understand all the results of the correlations coefficients. About the "upper back" is the only item with variations in all three questions, I am sorry but I have to disagree! When we look to table 1 and 2 we saw variations: in proportions of pain and in the correlations coefficients, specially in neck and low back regions.

Literature advices:

* Reliability and validity are well investigated concepts in Public health and medicine.

Recommendation: Use the standard literature for citation (page 3/line 2f).

Already done.

Thank you for your time,

Kind regards,

Cristina Mesquita

Abstract

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Keywords cross cultural adaptation, reliability, validity, musculoskeletal symptomatology

Introduction

The European Foundation for the Improvement of Living and Working Conditions (2007) points out that Portugal is the third country in European Union with working disability due to musculoskeletal lesions.

The musculoskeletal symptomatology can be related with the individual characteristics such as age (Morken et al. 2002) but several studies have revealed a narrow correlation with working conditions. Often the workers are forced into repetitive and vibratory movements (Cherry et al. 2001; Dovrat and Katz-Leurer 2007; Guo 2002) to lifting and transporting weight, (Hoogendoorn et al. 2002; Tveito et al. 2004) to incorrect postures for long periods of time (Dovrat and Katz-Leurer 2007; Hoogendoorn et al. 2002; Jansen et al. 2004; Simoneau 1996) to long working hours (Allah-Mursula et al. 2004; Dembe et al. 2005; Guo 2002; Häkkinen et al. 2001; Shimizu

et al. 2004) and to the use of inadequate equipment (Chyuan et al. 2004; Häkkinen et al. 2001; Jansen et al. 2004; Lemasters et al. 1998; Moraes et al. 2002; National Health Committee 2000). All these factors create tension in soft tissues progressively causing musculoskeletal complaints including pain (Jansen et al. 2004; Kuorinka et al. 1987; Pinheiro 2002; Trolley et al. 2005).

The self-administered questionnaires are essential for clinical assessment and research. The availability and consistent use of established questionnaires in different languages facilitates the collection of reliable data in international multicentre studies. After a systematic search, the only Portuguese version found was the Standardized Nordic Musculoskeletal Questionnaire (Barros and Alexandre 2003). However, this version was for the Brazilian people thus, there is no guarantee that any of the Portuguese versions currently in use demonstrate the necessary equivalence with the original English or even with each other.

The cultural and linguistic adaptation of an instrument previously developed and validated represents an easy alternative in the use and disclosure of measurement in health. Therefore, until a measuring instrument can be used in different cultures it is necessary to ensure that the translations and the adaptations are equivalent (Ferreira 1996; Rosete and Ferreira 1996).

It is essential to consider two major goals, the evaluation of the linguistic and conceptual equivalences and the evaluation of the psychometric properties. According to the European Group on Health Outcomes (ERGHO) the above mentioned equivalences are those which enable us to consider whether a certain measurement instrument has a cultural equivalency or not. Since the measurement instrument at stake was already validated, the content criterion and technical equivalences have already been approached (Ferreira 1996; Rosete and Ferreira 1996). Although measurement had been discussed as a research tool and many specialists are concerned with the judging of their quality measures: validity and reliability (Medical Outcomes Trust 1997). The validity can be defined as the extent to which any measuring instrument measures what it is intended to measure and the reliability refers to the consistency and dependability of the measure (Carmines and Zeller 1991).

The aims of this study were to carry out a cross-cultural adaptation of the Standardized Nordic Musculoskeletal Questionnaire (NMQ) for Portuguese workers and to investigate the psychometric properties of the Portuguese version.

Methods

Subjects

Sixty warehouse workers of a business group of food distribution participated in this study. The mean age was 34.6 ± 8.49 , the youngest 20 and the oldest 49. All the individuals carried out similar tasks under controlled temperature conditions (0-5°C). In addition, the company rules demand the use of protection against the cold (gloves, boots, special customs and back belts). The sample included the male workers who agreed to participate being excluded those

presenting recent musculoskeletal symptomatology and those that went through the medical consultation for treatment (Kuorinka et al. 1987).

The same group filled in the above-mentioned questionnaire again one week later. The questionnaire was individually self-administered in order to avoid any risks of contamination. All the participants were informed about the aim of the study and they all gave their consent according to the Helsinki Declaration.

Instruments

The NMQ consists of 27 binary choice questions (yes or no). The questionnaire has three questions applied to nine anatomic regions (neck, shoulders, wrists/hands, upper back, low back, hips/thighs, knees, ankles/feet). The first is "had some troubles or pain in the last 12 months", the second is "in the last 12 months felt some limitation caused by work in the daily activities", and the third is "had some troubles or pain in the last 7 days". According to the original author of the questionnaire for "troubles" we must understand pain, discomfort or ache (Kuorinka et al. 1987). In the sense of facilitating the identification of the corporal areas, the questionnaire also includes a corporal diagram detaching all of the involved corporal areas (Kuorinka et al. 1987).

In order to classify the pain in the "last 7 days" we included the numeric pain scale (Jensen and Karoly 2001; Miguel 2003) in this new version of the questionnaire.

Conceptual Equivalence and Linguistic or Semantic Equivalence

The process of the conceptual and linguistic equivalences began with the translation using official translators. When these versions were available, a consensus meeting was made to discuss and evaluate the first translation efforts. The objectives were to ensure that the target version was equivalent to the original version, conceptually and linguistically.

Later than, was realized a back translation to detect errors of meaning and concept nonequivalence.

After the conclusion of both translations, a reconciliation meeting was conducted to obtain a consensus version. The members of the panel consisted of two ordinary people (one administrative and one from the cleaning staff), two specialised physiotherapists two bilingual and independent translators (Medical Outcomes Trust 1997; Ferreira 1996; Rosete and Ferreira 1996).

To test this version, a pilot study was made with a pre-test with 10 selected individuals (workers in the Health School).

Validity

Validity is divided in three types: the content validity, the criterion validity and the construct validity. Essentially, content validity depends on the extent to which an empirical measure reflects a specific domain of content. Criterion validity could be assessed by correlating a measure and the criterion at the same point in time. Construct Validity is the ability of an

instrument to reflect the construct and is usually tested through Exploratory Factor Analysis (Carmines and Zeller 1991; Ferreira 1996; Rosete and Ferreira 1996).

Reliability

Reliability was assessed through internal consistency and test-retest reliability (Carmines and Zeller 1991; Ferreira 1996; Rosete and Ferreira 1996).

Internal consistency evaluates the extent to which items comprising a scale measure the same construct. Test-retest reliability is the ability of an instrument to produce similar results on repeated administration when, no real change in health status has occurred within this period (Carmines and Zeller 1991; Medical Outcomes Trust 1997; Ferreira 1996; Rosete and Ferreira 1996).

Statistical

Descriptive techniques were used to analyse and characterize the subjects. The criterion validity was tested through the Kendall's tau-b correlation coefficient.

The internal consistency was tested through the Kuder-Richardson formula (KR20); the test-retest reliability was accessed with the Kappa agreement correlation coefficient.

All statistical analyses were performed using SPSS Statistical Software (SPSS 17.0 for Windows) and the STATA (Data Analysis and Statistical Software) with a 5% significance level.

Results

The results showed that the majority of the workers had no pain or discomfort in the nine regions of the body, especially during the last 12 months. In the regions Elbows, Hips/Thighs, none of them refer pain or discomfort, just in the regions Shoulders, Wrists/Hands, Knees, Ankles/Feet (4 workers) refer pain or discomfort giving problems in daily living; they also refer some problem in the last 7 days. They classified their pain as mild.

On the other hand, 24 workers described the low back as the major region complain in all three variables and they classified their pain as moderate to severe interfering in their daily activities during for the last 12 months and persisting in the last 7 days. This fact (severe pain) only occurred in low back and ankle/feet region however, with much less proportion in the last one as we can see in table 1.

According to table 1, we can see beside the low back region was the upper back (13 workers) with pain or discomfort, in the last 12 months. Most of those problems had interferences in their daily living. The neck region (7 workers) was also one with pain or discomfort in the last 12 months and about half the workers complains had interferences in their daily living. Nonetheless, the workers classified their pain in both regions mild to moderate.

Insert Table 1

Validity

After the translation into Portuguese and the subsequent retranslation to the original language of the NMQ it was verified that, there were no relevant changes in the meaning of the items. Afterwards the intelligibility comprehensibility and the writing of the scale have been accessed focusing on the NMQ items, which were translated into Portuguese.

In the end, a consensus about the translation of the NMQ was obtained and a definitive questionnaire was constructed.

The results of Kendall's tau-b correlation coefficient demonstrated existence of association to the upper back region variable "last 7 days" (0.350 to $p < 0.01$), low back region variable "last 7 days" (0.290 to $p < 0.05$), and low back region variable "limitations in daily activities" (0.479 to $p < 0.01$). These results showed a positive correlation moderate and statistically significant between Nordic Musculoskeletal Questionnaire and the Oswestry Disability Index.

Reliability

The NMQ test-retest reliability with a week interval using the Kappa agreement correlation coefficient showed values between 0.677 and 1. The variables with highest correlation coefficient, 1, were shoulders, wrist/hands and knees regions (Table 2).

According to table 2, it can be observed that the majority of the correlation coefficients (0.8 to 1) demonstrated the existence of a strong to a very strong association indicative of good reliability levels test-retest. The results showed that in only one of the variables we verified a value considered medium (0.677).

In some variables was not possible to compute the test because all the individuals gave the same answer in the two moments ("no pain or discomfort"). That occurs in the elbows and hip/thighs regions in the tree variables (Table 2).

The internal consistency has been verified by Kuder-Richarson coefficient of reliability, which showed a correlation coefficient of 0.855.

Insert Table 2

Discussion

The cultural and linguistic adaptations of the Standardized Nordic Musculoskeletal Questionnaire (NMQ) to the Portuguese workers involve the translation from the original language to Portuguese and the psychometric properties analysis (validity and reliability). Those processes have been achieved without difficulties and were carried out in accordance with the

1 Medical Outcomes Trust (1997) procedures and ERGHO (Ferreira 1996; Rosete and Ferreira
2 1996). The content validity was obtained during the translation and retranslation process
3 recurring to a panel of judges constituted by a multidisciplinary panel (ordinary people bilingual
4 official translator and physiotherapists). This panel checked the clearness the inclusion of all
5 concepts and the redundancy of the instrument's items (Hutchinson et al. 1997; Meadows et al.
6 1997). The validity criterion of this version that has been tested with the Oswestry Disability
7 Index showed a moderate and positive correlation when considering the upper back and low
8 regions variable "last 7 days" and low back region variable "limitations in daily activities". We
9 could not find the same correlation with the other regions or variables due to the fact that the
10 Oswestry Disability Index only measures the impact of disability of low back pain (Fairbank et al.
11 1980) limiting our study. On the other hand, in our country, this instrument is the most similar to
12 the NMQ that we have translated and validate.
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20 The result of the test-retest showed an excellent level of reliability as per the high values of
21 correlation obtained in the majority of variables (table 2). Only one correlation coefficient was
22 inferior to 0.7 and in the others was always around 0.9 to 1. Our results are in accordance with
23 the original version that variance was 0.8 to 1 (Kuorinka et al. 1997) and another one from
24 Palmer et al.1999). In a study about "...Reliability of a Self-Administered Musculoskeletal
25 Symptoms..." they also determined Kappa coefficients with values of 1. The cross cultural
26 adaptation and validation of NMQ to the Brazilian people also revealed very good results of
27 reliability between 0.63 and 1 (Barros and Alexandre 2003). A recent investigation in Australia
28 revealed values of $k/k_{\max} = 0.71-0.96$ and $k/k_{\max} = 0.76-1.00$ on groups in study (Dawson et al.
29 2009).
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35 As we could see in table 2 ten of the twenty-seven variables of NMQ could not be computed
36 because the answers were equal at both moments in all individuals, everybody referred "No
37 pain or discomfort in the last 12 months or 7 days" and kept their opinion during the study. Still,
38 we thought that our results can be swollen by the characteristics of our sample. In general they
39 were young adults reveling very good results, no pain at most body regions contributing to the
40 consisting of the answers. Another explanation could be the fact of the questionnaire be
41 binomial answer which contributing to a major consisting of response.
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48 The internal consistency of the Portuguese version of the NMQ demonstrated by the results
49 Kuder-Richarson coefficient of the 0.855 was good (Carmines and Zeller 1991). We could not
50 compare the results with other studies because in all that we find they did not revealed the
51 internal consistency correlation coefficient.
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55 Adding to all the information previously described we think this measuring instrument should be
56 applied to subjects with different characteristics from those that participated in this study with
57 the purpose of achieving a bigger and better representation of the Portuguese population.
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Conclusions

We believe that the Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire is functional and easily understood.

The Standardized Nordic Musculoskeletal Questionnaire showed good reliability and moderate validity.

Conflict of interest statement The authors disclose any relevant associations that might pose a conflict of interest.

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Simoneau 1996- corrected

* There are "double blanks" and breaks (for instance page 2/line 21, page 5/line 3) – corrected.

* It is uncommon to state the used statistical software. Recommendation: leave it out.

I am sorry, but I do not agree with you. Following the editorial instruction in the examples that I saw it is used the statistical software. Besides, in my opinion I think it is important because it was used two statistical software.

Theoretical advices:

* The concept of validity does not appear before the section "Statistical". Recommendation: Include this concept in the introduction.

Thank you very much for this advice. Already done, also I include in Methods near the Reliability

* The authors say "We believe that the Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire for Portuguese workers seems to be valid and reliable." The findings of the paper support this statement just for the reliability. For the validity the results are weaker. This assumption needs to be explicitly tailored to findings.

Thank you very much for this advice. The results and discussion are now more clear and rich.

* How to read table 2? What does number 1 mean? That all respondents gave the same answer at time x and time y? Recommendation: Outline one example of interpretation in the text.

* Please provide an explanation why the "upper back" is the only item with variations in all three questions?

The interpretation of 1 means that all the individuals gave the same answer in the 2 moments with a one-week interval. I think now the results, as I said before are more clear and rich. The explanation of table 1 will be helpful to understand all the results of the correlations coefficients. About the "upper back" is the only item with variations in all three questions, I am sorry but I have to disagree! When we look to table 1 and 2 we saw variations: in proportions of pain and in the correlations coefficients, specially in neck and low back regions.

Literature advices:

* Reliability and validity are well investigated concepts in Public health and medicine. Recommendation: Use the standard literature for citation (page 3/line 2f).

Already done.

Thank you for your time,
Kind regards,
Cristina Mesquita

Table 1. Percentage of complains in all regions.

Location of the pain	Questions					
	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness)?		Have you at any time during the last 12 months been prevented from doing your daily activities(at home or away from home) because of the trouble?		Have you had trouble at any time during the last 7 days?	
	Yes	No	Yes	No	Yes	No
Neck	11.7%	88.3%	6.7%	93.3%	6.7%	93.3%
Shoulders	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%
Elbows	0	100%	0	100%	0	100%
Wrists/Hands	6.7%	93.3%	0	100%	6.7%	93.3%
Upper back	21.7%	78.3%	20%	80%	15%	85%
Low back	40%	60%	20%	80%	35%	65%
Hips/Thighs	0	100%	0	100%	0	100%
Knees	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%
Ankles/Feet	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%

Table 2. The Kappa agreement correlation coefficient for each answer in the questionnaire

	Questions		
	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness)?	Have you at any time during the last 12 months been prevented from doing your daily activities(at home or away from home) because of the trouble?	Have you had trouble at any time during the last 7 days?
Location of the pain			
Neck	0.677	1	0.880
Shoulders	1	1	1
Elbows	_*	_*	_*
Wrists/Hands	1	1	_*
Upper back	0.779	0.784	0.934
Low back	0.866	1	0.927
Hips/Thighs	_*	_*	_*
Knees	1	1	_*
Ankles/Feet	1	_*	_*

*Could not be computed because all the variables were constant

Supplementary Material

[Click here to download Supplementary Material: 2 - QNM.doc](#)

Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire: cross cultural and reliability

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